



(REVIEW ARTICLE)



Understanding the concept of undernutrition among children up to 5 years of age

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Abstract

Addressing undernutrition among children requires a holistic approach that involves multiple stakeholders, including governments, policymakers, healthcare providers, communities, and families. Ensuring access to nutritious food, clean water, sanitation, and healthcare services are essential components of any strategy to combat undernutrition. Promoting exclusive breastfeeding for the first six months of life, promoting proper infant and young child feeding practices, and educating caregivers on the importance of nutrition in early childhood are crucial interventions to prevent undernutrition in young children. In addition to addressing the immediate causes of undernutrition, it is essential to address the underlying determinants, such as poverty, lack of education, inadequate healthcare services, and limited access to clean water and sanitation. Investing in social protection programs, improving access to education, promoting women's empowerment, and strengthening healthcare systems are key strategies to address the root causes of undernutrition among children up to five years of age. Undernutrition among children up to five years of age is a significant public health issue with far-reaching consequences on the health and well-being of individuals, families, and communities. By understanding the complex factors that contribute to undernutrition and implementing comprehensive strategies to address the problem, the review article tries to promote and prioritize the nutritional needs of young children and invest in interventions that promote their growth, development, and overall well-being.

Keywords: Undernutrition; Breastfeeding; Infant; Malnutrition; Underweight.

1. Introduction

1.1. Overview of Undernutrition

Undernutrition is a critical global health issue that affects millions of children each year. It occurs when individuals do not receive adequate nutrients to meet their daily needs, leading to stunted growth, poor cognitive development, and increased susceptibility to diseases. Early childhood undernutrition is of particular concern as it can impact a child's physical and mental development. Addressing early childhood undernutrition is crucial for several reasons. First and foremost, children are at a critical stage of growth and development during their early years. Nutrient deficiencies during this time can have long-term consequences on their overall health and well-being. Malnutrition in early childhood has been linked to cognitive impairments, decreased school performance, and a higher risk of chronic diseases later in life[1].

Furthermore, addressing early childhood undernutrition is essential for breaking the cycle of poverty. Children who suffer from undernutrition are more likely to experience lifelong challenges that prevent them from reaching their full potential. By ensuring that children receive adequate nutrition from a young age, we can help them grow and thrive, laying the foundation for a brighter future. Therefore, early childhood undernutrition is a pressing issue that demands immediate attention. By addressing this issue, we can improve the health and well-being of millions of children around

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the world, setting them on a path towards a better future. There is need to prioritize the health and nutrition of our youngest generation, as they are the key to building a healthier and more prosperous society [2].

Undernutrition Among Children in India: Undernutrition remains a significant public health concern in India, particularly among children under five years of age. Despite economic growth and various governmental initiatives, India continues to report high rates of child malnutrition, contributing to both immediate health challenges and long-term developmental setbacks[3].

1.2. Current Statistics of Undernutrition In India

According to the National Family Health Survey (NFHS-5) (2019-2021):

- Stunting (low height-for-age): 35.5% of children under five
- Wasting (low weight-for-height): 19.3%
- Underweight (low weight-for-age): 32.1%
- Anemia: 67.1% of children aged 6-59 months suffer from anemia.

These figures reflect significant disparities across states, with rural areas generally experiencing higher rates of undernutrition compared to urban regions.

2. Causes of Undernutrition in India

Poverty and Food Insecurity: Despite improvements, poverty remains a driving force behind undernutrition in India. Low-income households often have limited access to nutritious food, leading to poor diets for children.

Poor Maternal Health: Many women in India suffer from undernutrition during pregnancy, which directly impacts the health of their newborns. Children born to undernourished mothers are more likely to be stunted or underweight.

Inadequate Infant and Young Child Feeding Practices: Lack of exclusive breastfeeding, early weaning, and improper complementary feeding are common, leading to poor nutrition in the critical first two years of life.

Lack of Access to Clean Water and Sanitation: Poor hygiene and sanitation contribute to recurrent infections such as diarrhea, which further exacerbate malnutrition by reducing nutrient absorption.

Infectious Diseases: Frequent illnesses like diarrhea, malaria, and respiratory infections create a cycle where malnourished children are more vulnerable to illness, and illness further weakens their nutritional status.

Gender Disparities: In some regions, cultural preferences for male children lead to gender-based discrimination in feeding practices and healthcare, which affects the nutritional status of girls more severely.

2.1. Challenges in Addressing Undernutrition

Implementation Gaps: While policies exist, their implementation often faces challenges such as inadequate funding, lack of trained healthcare workers, and poor monitoring.

Regional Disparities: States such as Bihar, Jharkhand, and Uttar Pradesh continue to have higher rates of malnutrition compared to southern states like Kerala and Tamil Nadu.

Urban-Rural Divide: Rural areas are more affected by undernutrition due to factors like food insecurity, poor access to healthcare, and lower educational attainment.

Cultural Barriers: In some communities, traditional beliefs and practices can limit the effectiveness of nutrition programs, particularly when it comes to breastfeeding, weaning, and food choices for children.

3. Consequences of Undernutrition in Kids

Undernutrition in kids is a serious issue that can have detrimental consequences on their health and development. When children do not receive an adequate amount of nutrients from their diet, it can lead to a range of physical and mental health problems. One of the most immediate consequences of undernutrition in kids is stunted growth. Without proper

nutrition, children may not reach their full height potential and may experience delays in other physical development milestones. In addition, undernourished children are more likely to suffer from infections and illnesses, as their immune systems are compromised due to lack of essential nutrients[4].

Undernutrition can also long-term affect a child's cognitive and emotional development. Children who do not receive enough nutrients may have difficulty concentrating, learning, and retaining information. They may also experience behavioral issues such as irritability, mood swings, and aggression. These challenges can impact a child's academic performance and overall well-being. Furthermore, undernutrition can have lasting effects on a child's overall health and quality of life. Children who are undernourished are at a higher risk of developing chronic conditions such as anemia, obesity, diabetes, and cardiovascular disease later in life. This can lead to a lifetime of health problems and decrease the child's life expectancy. Undernutrition in kids is a serious issue with far-reaching consequences. Parents, caregivers, and policymakers must prioritize proper nutrition for children to ensure their physical and mental well-being. By providing children with a balanced diet rich in essential nutrients, we can help prevent the negative consequences of undernutrition and set them up for a healthy and successful future[5].

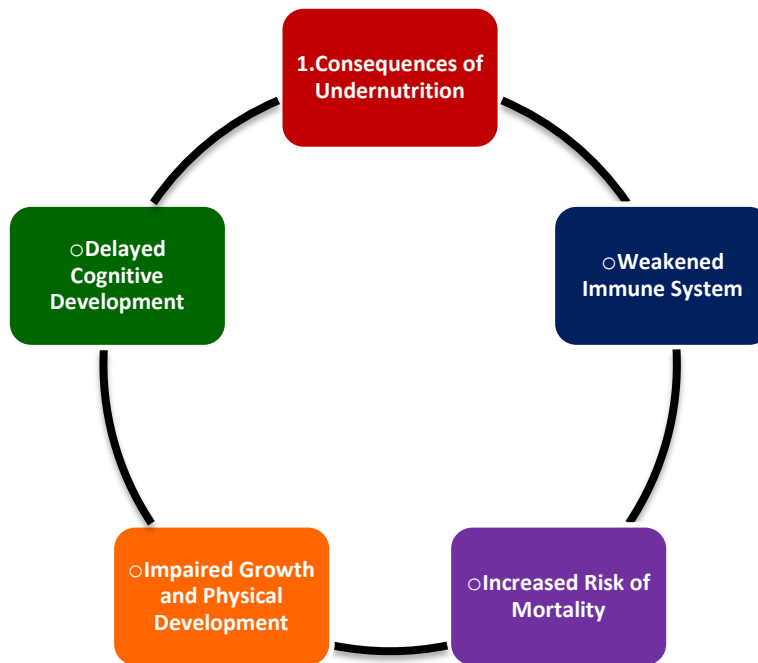


Figure 1 Showcasing the consequences of Undernutrition in Children upto 5 Years of age.

4. Prevention and Intervention Strategies for Undernutrition in India

Undernutrition is a serious issue in India, with many people, especially children, not getting enough food or nutrients to support their growth and development. It is estimated that nearly 20% of Indian children under the age of five are underweight, which can have long-term negative effects on their physical and cognitive development. Prevention and intervention strategies are crucial in addressing undernutrition in India. One important strategy is promoting breastfeeding, as breast milk provides essential nutrients and antibodies that help protect against infections and diseases.[6] It is recommended that mothers exclusively breastfeed their infants for the first six months of life, as this can greatly reduce the risk of undernutrition. Government Initiatives to Combat Undernutrition India has implemented several programs aimed at improving child nutrition, including:

4.1. Integrated Child Development Services (ICDS)

Launched in 1975, ICDS is one of the largest government programs in the world aimed at improving maternal and child nutrition. It provides supplementary nutrition, healthcare, and early childhood education to children under six years of age, along with pregnant and lactating women.

4.2. Mid-Day Meal Scheme (MDMS)

This program provides nutritious meals to school-aged children across India, helping to improve dietary intake and reduce malnutrition.

4.3. National Nutrition Mission (POSHAN Abhiyaan)

Launched in 2018, POSHAN Abhiyaan aims to reduce stunting, underweight, and anemia by improving the delivery of essential nutrition interventions. The mission promotes behavior change, sanitation, and the use of technology to monitor nutritional outcomes.

4.4. Pradhan Mantri Matru Vandana Yojana (PMMVY)

This maternity benefit scheme provides financial incentives to pregnant and lactating women to ensure better health and nutrition practices during and after pregnancy.

Another key strategy is improving access to nutritious foods. Many families in India cannot afford to buy nutritious foods like fruits, vegetables, and protein-rich foods. Government programs like the Integrated Child Development Services (ICDS) and the Mid-Day Meal Scheme provide free or subsidized meals to children in schools and anganwadis, which can help ensure they receive the nutrients they need to grow and thrive. Nutrition education is also essential in preventing undernutrition. Many people in India are not aware of the importance of a balanced diet or how to prepare nutritious meals. By educating families about the benefits of healthy eating and providing them with the knowledge and skills to prepare nutritious meals, we can help prevent undernutrition in the long run[7].

Regular health check-ups can also help identify undernutrition early on and provide timely intervention. Doctors and healthcare workers can monitor children's growth and development and provide nutritional supplements or medical treatment when necessary. Undernutrition is a serious issue in India that requires a multi-faceted approach to address. By promoting breastfeeding, improving access to nutritious foods, providing nutrition education, and conducting regular health check-ups, we can help prevent undernutrition and ensure that every child in India has the opportunity to thrive and reach their full potential.

4.5. Solutions and the Way Forward

Improving Healthcare Access: Expanding healthcare infrastructure in rural areas, training more community health workers, and ensuring that undernourished children receive regular check-ups can significantly improve outcomes.

Promoting Nutrition Education: Educating mothers and families about the importance of a balanced diet, exclusive breastfeeding, and proper weaning practices is critical.

Strengthening Food Security: Expanding access to affordable, nutritious food through initiatives such as public distribution systems and food fortification can help reduce malnutrition.

Behavior Change and Social Awareness: Focusing on changing social and gender norms related to nutrition, sanitation, and child-rearing practices can ensure more equitable access to nutrition for all children.

5. Global and National Efforts to Combat Undernutrition

Undernutrition remains a pressing issue that affects millions of individuals around the world. It is a condition where an individual does not receive adequate nutrition to maintain good health and well-being. This can lead to a range of negative effects, including stunted growth, weakened immune systems, and even death. In response to this global challenge, both national governments and international organizations have been making efforts to combat undernutrition.

On a global level, organizations such as the United Nations, World Health Organization, and World Food Programme have been leading the charge in addressing undernutrition. These organizations work together to provide food aid, nutritional supplements, and education to communities in need. They also conduct research and raise awareness about the impacts of undernutrition on individuals and societies[8,9]. Through these efforts, they aim to reduce the prevalence of undernutrition and improve the health and well-being of those affected.

At the national level, many countries have implemented strategies and programs to combat undernutrition within their own borders. For example, governments may provide subsidized food programs for low-income families, implement

nutrition education initiatives in schools, and support breastfeeding initiatives for mothers. These efforts aim to ensure that all citizens have access to nutritious food and the knowledge and resources to make healthy choices. One notable example of a national effort to combat undernutrition is India's National Food Security Act. This legislation aims to provide food and nutritional security to a large portion of the population by offering subsidized food grains to eligible families. By ensuring that all citizens have access to basic nutrition, the Indian government hopes to reduce the prevalence of undernutrition and improve the overall health of its population. Despite these efforts, undernutrition continues to be a persistent issue in many parts of the world. Factors such as poverty, food insecurity, and lack of access to healthcare all contribute to the prevalence of undernutrition. In order to effectively combat this issue, it is crucial for both global and national efforts to be coordinated and sustained over the long term[10,11].

6. Importance of Early Intervention in Undernutrition Among Children Under 5 Years

6.1. Critical Period for Growth and Development

The first five years of life are essential for physical, cognitive, and emotional development. During this time, the brain and body undergo rapid growth, and proper nutrition is vital. Early intervention in addressing undernutrition ensures that a child receives the necessary nutrients during this crucial period, preventing irreversible damage, particularly in brain development. The effects of malnutrition during this stage can lead to lifelong consequences, including stunted physical growth and impaired cognitive function.

6.2. Prevention of Stunting and Wasting

Stunting (chronic malnutrition) and wasting (acute malnutrition) are common forms of undernutrition in children under five, especially in developing countries. Stunting, in particular, becomes permanent after the age of two. Early intervention helps prevent these conditions, allowing children to reach their full height and weight potential. Intervening before these growth deficits set in is key to averting lifelong physical and developmental consequences[12].

6.3. Improved Cognitive Development

Adequate nutrition in the early years directly influences cognitive function. Undernutrition affects the brain's development, reducing a child's capacity for learning, memory, and attention. Early nutritional interventions, such as breastfeeding, complementary feeding, and micronutrient supplementation, help support proper brain development, enhancing educational outcomes later in life. Addressing undernutrition early can significantly improve IQ levels, school performance, and productivity in adulthood.

6.4. Strengthening the Immune System

Undernourished children are more susceptible to infections and illnesses such as pneumonia, diarrhea, and measles, which further exacerbate nutritional deficiencies. Early intervention strengthens the immune system, reducing the frequency and severity of infections. By improving overall health, early intervention helps break the vicious cycle of illness and malnutrition, giving children the chance to grow healthier and more resilient.

6.5. Reducing Child Mortality

Severe acute malnutrition (SAM) is a leading cause of child mortality, particularly in low-income countries. Children with SAM are nine times more likely to die from common infections than well-nourished children. Early intervention can significantly reduce child mortality by addressing undernutrition before it leads to life-threatening complications. Programs like therapeutic feeding and healthcare interventions play a crucial role in saving lives[13].

6.6. Better Long-term Health Outcomes

Children who suffer from undernutrition are at higher risk of developing chronic health issues such as diabetes, heart disease, and obesity later in life. Early interventions in child nutrition reduce the likelihood of these long-term health problems by promoting proper growth and a balanced metabolic system[14]. Ensuring that children are adequately nourished in the early years sets the foundation for a healthier adulthood.

7. Economic and Social Benefits

Children who receive proper nutrition in the early years are more likely to grow up healthier, perform better in school, and become more productive members of society. This contributes to a country's overall economic growth and development. Conversely, undernutrition imposes significant economic costs through lost productivity, increased

healthcare expenses, and diminished educational outcomes. Early intervention thus benefits both individuals and society by fostering a healthier and more capable population.

8. Improved Maternal Health and Nutrition

Early intervention also includes addressing the nutrition of pregnant and lactating women, which directly impacts the health of the child. Improving maternal nutrition ensures that children are born with a healthy birth weight and reduces the risk of undernutrition in infancy and early childhood. Programs that focus on maternal health, such as providing prenatal vitamins and iron supplements, contribute to better outcomes for both mother and child.

9. Behavioral Change and Long-term Habits

Intervening early in a child's life also provides an opportunity to educate parents and caregivers about proper feeding practices, hygiene, and health care. Early interventions help establish healthy dietary habits that can carry into adulthood, promoting lifelong well-being. Educational programs on nutrition, breastfeeding, and complementary feeding practices enable parents to make informed choices about their children's diet and health[15].

Early intervention in undernutrition is essential for ensuring that children under five have the best chance at a healthy and productive future. By addressing nutritional deficiencies early, we can prevent stunting, wasting, cognitive delays, and increased susceptibility to diseases, and improve long-term health outcomes. Investment in early nutrition not only improves the well-being of children but also yields significant societal and economic benefits. Early, targeted interventions are key to breaking the cycle of malnutrition and poverty, ensuring that every child can thrive.

10. Ayurvedic Treatment to Cure Undernutrition Among Children

Undernutrition is a prevalent issue among children in many parts of the world, particularly in developing countries. This condition can have serious consequences on a child's physical and cognitive development, leading to stunted growth, weakened immune systems, and decreased cognitive functioning. While conventional treatments for undernutrition typically involve nutritional supplementation and dietary interventions, some practitioners turn to alternative forms of medicine, such as Ayurveda, in search of solutions[16].

Ayurveda, an ancient system of medicine originating in India, offers a holistic approach to health that considers the physical, mental, and emotional well-being of an individual. In Ayurveda, undernutrition is often viewed as a result of an imbalance in the body's doshas, or energy forces. By addressing this imbalance through various treatment modalities, Ayurvedic practitioners believe they can improve the overall health and well-being of undernourished children.

One of the key components of Ayurvedic treatment for undernutrition is the use of herbal remedies and dietary supplements. These natural remedies are believed to nourish the body at a cellular level, promoting better digestion, absorption, and assimilation of nutrients. Common herbs used in Ayurvedic preparations for undernutrition include ashwagandha, shatavari, and triphala, which are believed to have rejuvenating and nourishing properties. Ayurvedic treatments for undernutrition in children focus on natural, holistic remedies that help improve digestion, enhance nutrient absorption, and boost immunity. Ayurvedic herbs and formulations aim to strengthen the child's body and provide essential nutrients. However, it's important to consult a healthcare provider or an Ayurvedic practitioner before starting any treatment to ensure it's safe and effective.

10.1. Ayurvedic Drugs and Herbs for Undernutrition in Children

10.1.1. Ashwagandha (*Withania somnifera*)

Benefits: Ashwagandha is known for its ability to improve strength, promote growth, and increase appetite in children. It also helps boost immunity and improve muscle mass.

Form: Often available as powder, churna, or capsules, it can be mixed with milk or ghee for consumption.

10.1.2. Shatavari (*Asparagus racemosus*)

Benefits: Shatavari is a powerful herb for nourishing the body and enhancing digestive health. It supports the overall development of children, especially in improving appetite and digestion.

Form: Shatavari powder or syrup can be administered to children with honey or milk.

10.1.3. *Bala (Sida cordifolia)*

Benefits: Bala is an excellent herb for improving body strength and enhancing muscle development. It is commonly used in Ayurveda for children with weakness and poor weight gain.

Form: Often used in combination with other herbs in the form of decoctions, powders, or oils for massages.

10.1.4. *Chyawanprash*

Benefits: Chyawanprash is a popular Ayurvedic tonic rich in amla (Indian gooseberry), which is high in vitamin C. It strengthens the immune system, improves appetite, and promotes healthy digestion and growth in children.

Form: A semi-solid jam-like formulation that can be given daily.

10.1.5. *Pippali (Piper longum)*

Benefits: Pippali stimulates digestion, enhances appetite, and promotes nutrient absorption, making it effective in cases of malnutrition.

Form: Powder form, commonly combined with other herbs for digestive enhancement.

10.1.6. *Amalaki (Emblica officinalis)*

Benefits: Amalaki (Indian gooseberry) is rich in antioxidants and vitamin C, promoting good digestion, enhancing immunity, and helping in nutrient absorption. It is also a core ingredient in many Ayurvedic formulations for undernutrition.

Form: Can be consumed as powder, juice, or part of other Ayurvedic formulations like Chyawanprash.

10.1.7. *Guduchi (Tinospora cordifolia)*

Benefits: Guduchi is a potent immune booster and aids in improving metabolism and appetite in undernourished children. It helps in detoxifying the body and promoting vitality.

Form: Available in powder or tablet form, can be given in small doses regularly.

10.1.8. *Draksha (Vitis vinifera)*

Benefits: Draksha (grapes) is used in Ayurveda for its high nutritional value, improving digestion, and increasing body weight. It is helpful for children suffering from undernutrition and weakness.

Form: Grape juice or dried grape (raisins) are commonly used as a natural supplement.

10.1.9. *Vidarikand (Pueraria tuberosa)*

Benefits: Vidarikand helps in enhancing strength, body weight, and overall health in children. It improves appetite and helps in better digestion of food.

Form: Can be taken in powder form mixed with milk or honey.

10.1.10. *Ghee (Clarified Butter)*

Benefits: Ghee is highly nutritious and an excellent source of healthy fats, promoting better absorption of vitamins and minerals. It strengthens bones, boosts immunity, and improves overall strength in undernourished children.

Form: Ghee can be added to meals or given in small amounts with Ayurvedic herbs like Ashwagandha or Shatavari.

10.1.11. *Ayurvedic Diet Recommendations for Undernutrition*

In addition to herbal remedies, Ayurvedic treatment for undernutrition also emphasizes dietary modifications tailored to the individual child's dosha imbalance. For example, children with a predominance of the vata dosha may be advised

to consume warm, grounding foods such as soups, stews, and cooked grains, while those with a pitta dosha imbalance may benefit from cooling foods like cucumber, coconut water, and leafy greens.

Balanced Diet: Ayurveda recommends a balanced diet rich in carbohydrates, proteins, and fats. Include fresh fruits, vegetables, whole grains, and dairy products in the child's diet.

Milk and Ghee: Milk is considered a complete food in Ayurveda, and ghee helps in improving digestion and absorption of nutrients.

Porridges and Soups: Light, easily digestible meals like rice porridge (khichdi), moong dal soup, and vegetable soups can help in nourishing undernourished children.

Herbal Teas and Decoctions: Herbal teas made from digestive herbs like fennel (Saunf), cumin (Jeera), and coriander can improve digestion and appetite.

Ayurvedic treatment for undernutrition also often includes lifestyle modifications, such as stress reduction techniques, mindful eating practices, and regular exercise. These holistic approaches aim to address the underlying causes of undernutrition, such as poor digestion, chronic stress, and inadequate nutrient absorption, rather than simply treating the symptoms. While Ayurvedic treatment for undernutrition holds promise as a natural and holistic approach to improving the health of undernourished children, it is important to note that it should not replace conventional medical treatment. Ayurvedic remedies should be used in conjunction with medical interventions and under the guidance of a qualified practitioner to ensure safety and efficacy. In conclusion, Ayurvedic drugs and treatments offer a holistic approach to addressing undernutrition in children, focusing on restoring balance to the body's energy forces, nourishing the cells, and promoting overall health and well-being. By incorporating herbal remedies, dietary modifications, and lifestyle changes, Ayurvedic practitioners aim to improve the nutritional status of undernourished children and support their growth and development[17].

11. Conclusion

Addressing undernutrition is crucial not only for the immediate health and well-being of individuals but also for the long-term benefits it can bring to society as a whole. One of the long-term benefits of addressing undernutrition is improved economic productivity. Malnourished individuals are more likely to suffer from health problems and chronic diseases, making them less able to work and contribute to their communities. By addressing undernutrition and ensuring that individuals have access to nutritious food, we can help improve their health and well-being, enabling them to be more productive members of society. This ultimately leads to an increase in overall economic productivity and growth, benefiting the entire community. In addition to economic benefits, addressing undernutrition can also lead to improvements in education outcomes. Malnourished children often struggle with cognitive development and learning, which can have long-lasting effects on their academic performance. By providing children with access to proper nutrition, we can help improve their cognitive abilities, concentration, and memory, leading to better academic performance and higher rates of educational attainment. This not only benefits the individual child but also has a positive impact on society as a whole by creating a more educated and skilled workforce.

Furthermore, addressing undernutrition can have long-term benefits for public health. Malnourished individuals are more susceptible to infections and diseases, leading to higher rates of morbidity and mortality. By ensuring that individuals have access to a nutritious diet, we can help strengthen their immune systems and improve their overall health, reducing the burden of disease on healthcare systems. This can lead to lower healthcare costs, improved public health outcomes, and a higher quality of life for individuals and communities. In conclusion, addressing undernutrition is crucial for improving the health and well-being of individuals in both the short and long term. By investing in nutrition programs and policies that address undernutrition, we can unlock a range of long-term benefits for society, including improved economic productivity, better education outcomes, and enhanced public health [20]. It is essential that governments, organizations, and individuals work together to address undernutrition and ensure that everyone has access to the nutrition they need to thrive. By doing so, we can create a healthier, more prosperous, and more equitable society for all.

Compliance with ethical standards

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No conflict of interest to be disclosed.

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